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1.6 PROBABILITY

AS 90194

Determine probabilities

1.6 1. Determine probabilities from a table of statistical data A

► Jan has three different kinds of flowers in her garden. There are four different colours of flowers. The table shows the colours of the flowers on her birthday.

Flowers	Purple	Yellow	Red	White	Totals
Sweet Peas	15	0	63	21	99
Roses	0	2	5	3	10
Pansies	20	20	15	10	65
Totals	35	22	83	34	174

- (a) On her birthday Jan picked a flower at random from her garden. What was the probability that it was a red flower?
- (b) Bob picked a pansy at random from Jan's garden on her birthday. Assuming that Jan's flower in (a) wasn't a pansy, what is the probability that Bob's pansy was white?

► Student numbers at Waterview High School

Year Level	Year 9	Year 10	Year 11	Year 12	Year 13	Totals
Boys	110	120	125	70	35	460
Girls	120	135	135	75	45	510
Totals	230	255	260	145	80	970

- (a) What is the probability that a randomly chosen student was in Year 11?
- (b) What is the probability that a randomly chosen boy was in Year 11?

1.6 2. Determine theoretical probabilities A

► Jan and Alison play a game where prizes are shown on a wheel. The winner of the game spins the wheel to get a prize.

30% of the prizes shown on the wheel are worth over \$20.

- (a) Jan wins two games and spins the wheel twice to get her two prizes. What is the probability that both prizes are worth over \$20?
- (b) Alison also wins two games and spins the wheel twice to get her two prizes. What is the probability that only one of her two prizes is worth over \$20?

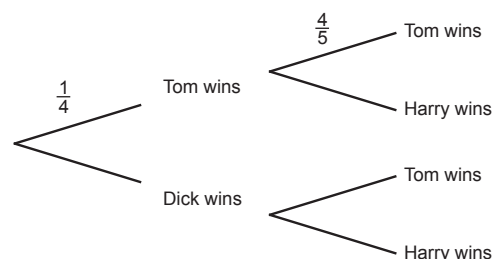
1.6 3. Solve probability problems involving at least two events M

- tree diagrams
- may include informal treatment of conditional probability

► Tom, Dick and Harry often play tennis. When Tom and Dick play, Tom wins $\frac{1}{4}$ of the games. When Tom and Harry play, Tom wins $\frac{4}{5}$ of the games.

Tom plays one game of tennis with Dick and one game of tennis with Harry.

Some of the information is already shown on the diagram below.



- (a) What is the probability Tom wins both games?
- (b) What is the probability that Tom wins exactly one of the two games?

1.6 4. Explore probability situations to solve problems E

- describing a probability experiment
- using a probability tree in a reverse process
- solving more complex theoretical probability problems

► At the Olympic Games, New Zealand has one competitor in each of the 100 m Backstroke, 100 m Breaststroke and the 100 m Butterfly.

The Backstroke swimmer has a probability of 0.18 of qualifying for the final. The Breaststroke swimmer has probability of 0.10 of qualifying for the final. The Butterfly swimmer has a probability of 0.28 of qualifying for the final.

What is the probability that there will be at least two New Zealanders in the finals?

- (a) Sara has maths on four days each week. Her teacher checks the class's homework on only one of those days. The day is chosen at random by the teacher.

Students who have not done their homework for that day get a detention. Sara says she did her homework on 32 out of the 40 days on which she had maths last term.

Describe a simulation (probability experiment) that Sara could use to predict the probability that:

- (1) she had not done her homework AND
- (2) the teacher checked.

Assume that you have access to: coins, cards, spinners, dice and a random number generator on a calculator or computer. You must give sufficient detail in your description so that someone else could carry out the experiment.

You must state what you will record and how you will calculate the probability. Do not do the experiment.

- (b) Mark is in the same class. He said the probability that he got a detention was 0.175. Calculate the probable number of nights out of the 40 on which Mark did not do his homework.